Dump Body Hoists

Hoists are listed by class numerically then alphabetically by manufacturer. Standard body lengths are listed first for participating manufacturers within each class, followed by nonstandard body lengths, which are noted with an asterisk.

Rating Statement

The hoists listed in this section were classified by comparing the performance curve of the hoist to a set of standard performance curves through the complete lift cycle of 50 degrees.

Performance range determinations and ton capacity listings were calculated using the following criteria.

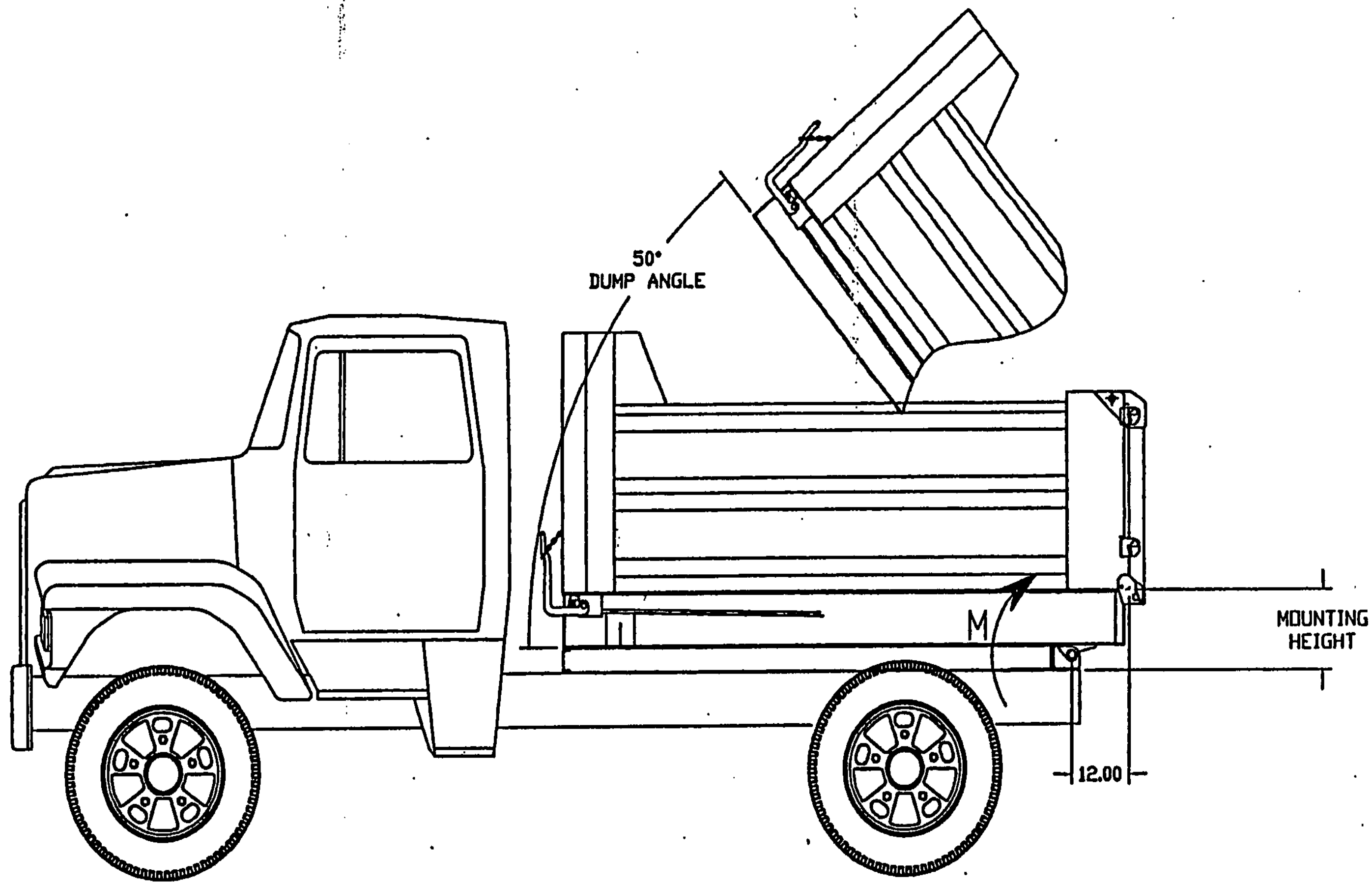
1. Liquid level, nondiminishing load
2. Minimum dump angle of 50 degrees
3. Body overhang of 12 inches

Performance Range Criteria

Performance Range	Minimum Breakaway Torque (inch-pounds)
Class 10	410,000
Class 20	630,000
Class 30	903,000
Class 40	990,000
Class 50	1,350,000
Class 60	1,950,000
Class 70	2,450,000
Class 80	3,200,000
Class 90	3,800,000
Class 100	4,400,000
Class 110	5,100,000
Class 120	5,900,000

Note: All units and measures are in English units.

FIG. 1

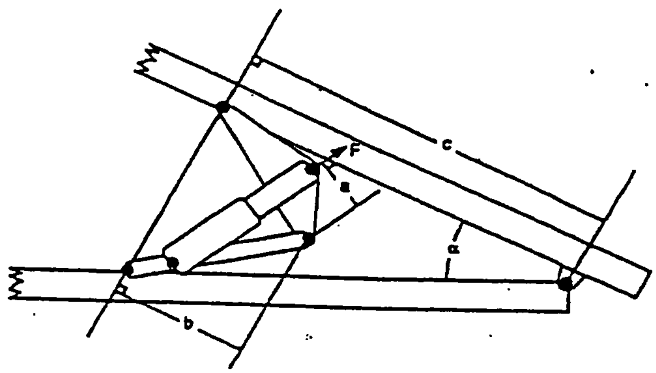


NTEA CLASS	MINIMUM MOMENT (M) BREAK AWAY TORQUE (IN-LB)
10	410,000
20	630,000
30	903,000
40	990,000
50	1,350,000
60	1,950,000
70	2,450,000
80	3,200,000
90	3,800,000
100	4,400,000
110	5,100,000
120	5,900,000

FIG. 2

TORQUE CALCULATION DIAGRAMS: TYPE I-IV

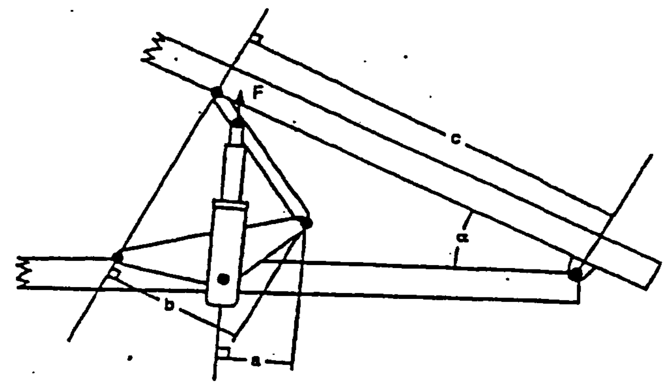
TYPE I - Single Stage Scissor



Torque at angle$_\alpha$:

$$T = \frac{F_\alpha\, a_\alpha\, c_\alpha}{b_\alpha}$$

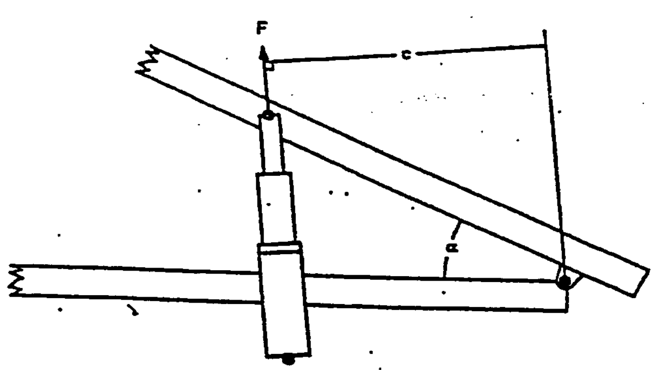
TYPE II - Telescopic Scissor



Torque at angle$_\alpha$:

$$T = \frac{F_\alpha\, a_\alpha\, c_\alpha}{b_\alpha}$$

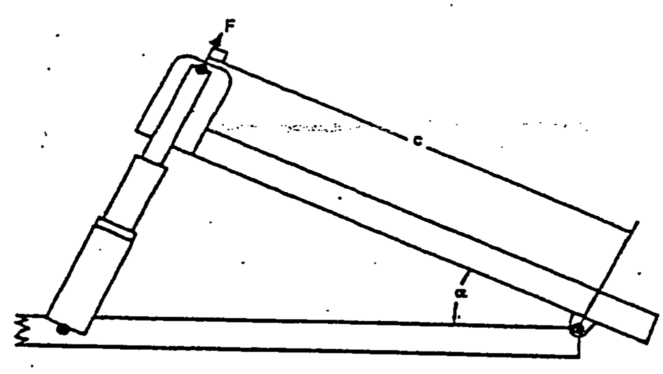
TYPE III - Standard Telescopic



Torque at angle$_\alpha$:

$$T = F_\alpha \times c_\alpha$$

TYPE IV - Front Mount Telescopic



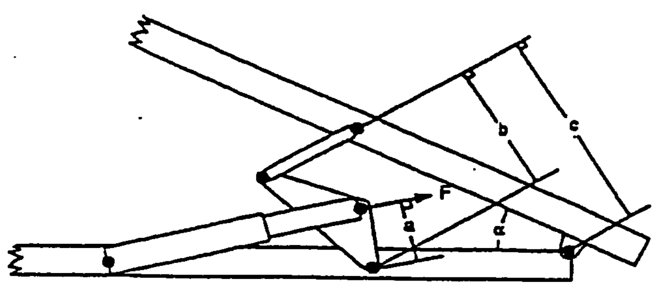
Torque at angle$_\alpha$:

$$T = F_\alpha \times c_\alpha$$

FIG. 3

TORQUE CALCULATION DIAGRAMS: TYPE V-VIII

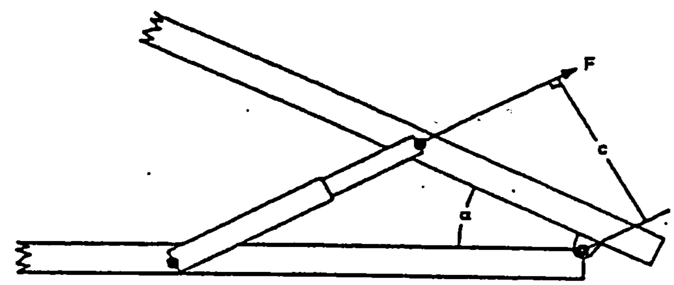
TYPE V - Under Body Hoist



Torque at angle$_\alpha$:

$$T = \frac{F_\alpha \, a_\alpha \, c_\alpha}{b_\alpha}$$

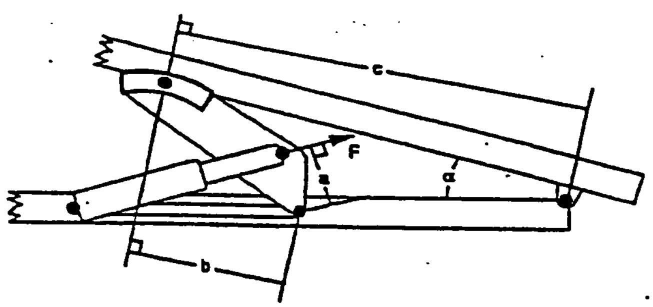
TYPE VI - Under Body Direct



Torque at angle$_\alpha$:

$$T = F_\alpha \times c_\alpha$$

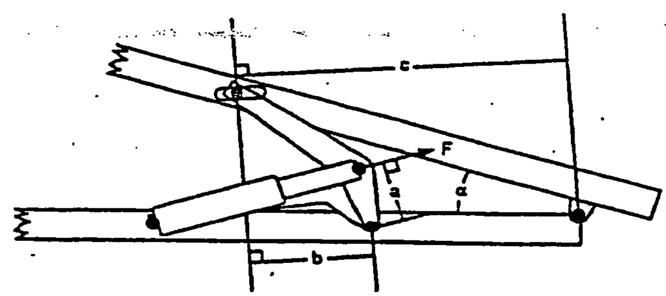
PE VII - Underbody Arm Roller (Phase 1)



Torque at angle$_\alpha$:

$$T = \frac{F_\alpha \, a_\alpha \, c_\alpha}{b_\alpha}$$

TYPE VIII - Lost Motion Scissor (Phase 1)



Torque at angle$_\alpha$:

$$T = \frac{F_\alpha \, a_\alpha \, c_\alpha}{b_\alpha}$$

FIG. 3 (continued)

Proposed Type IX

Torque at angle$_\alpha$:

$$T = \left(\frac{F_\alpha\, a_\alpha\, c'_\alpha}{b_\alpha}\right) + \left(F_\alpha \times c_\alpha\right)$$

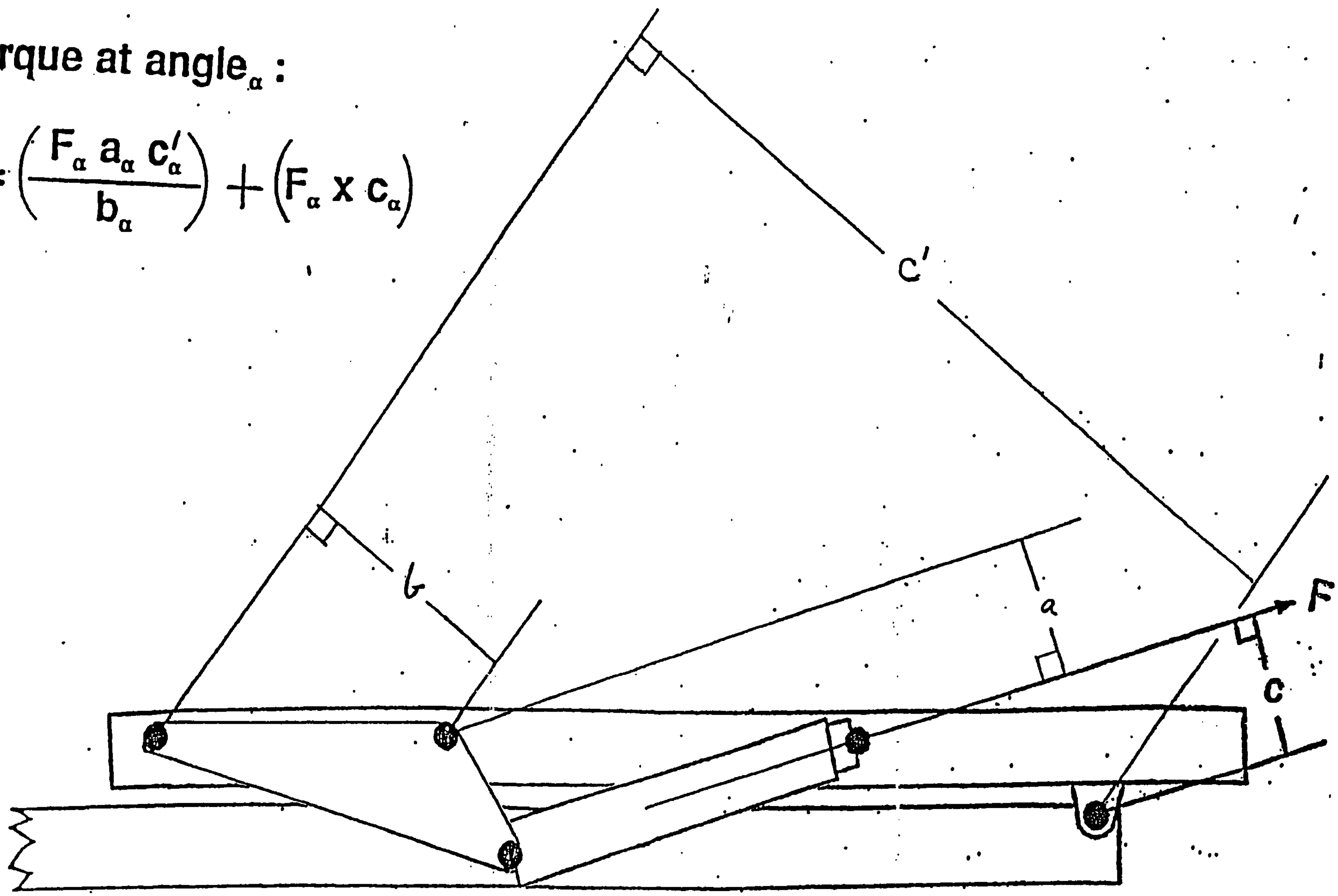


FIG. 3 (continued)

$$T = \frac{F a c}{b}$$

$$T = \frac{90{,}478\,(9.549)\,28.5653}{10.6668}$$

$$= 2{,}313{,}692 \text{ in-lb.}$$

$F = 90{,}478$

$a = 9.549$

$b = 10.6668$

$c = 28{,}5653$

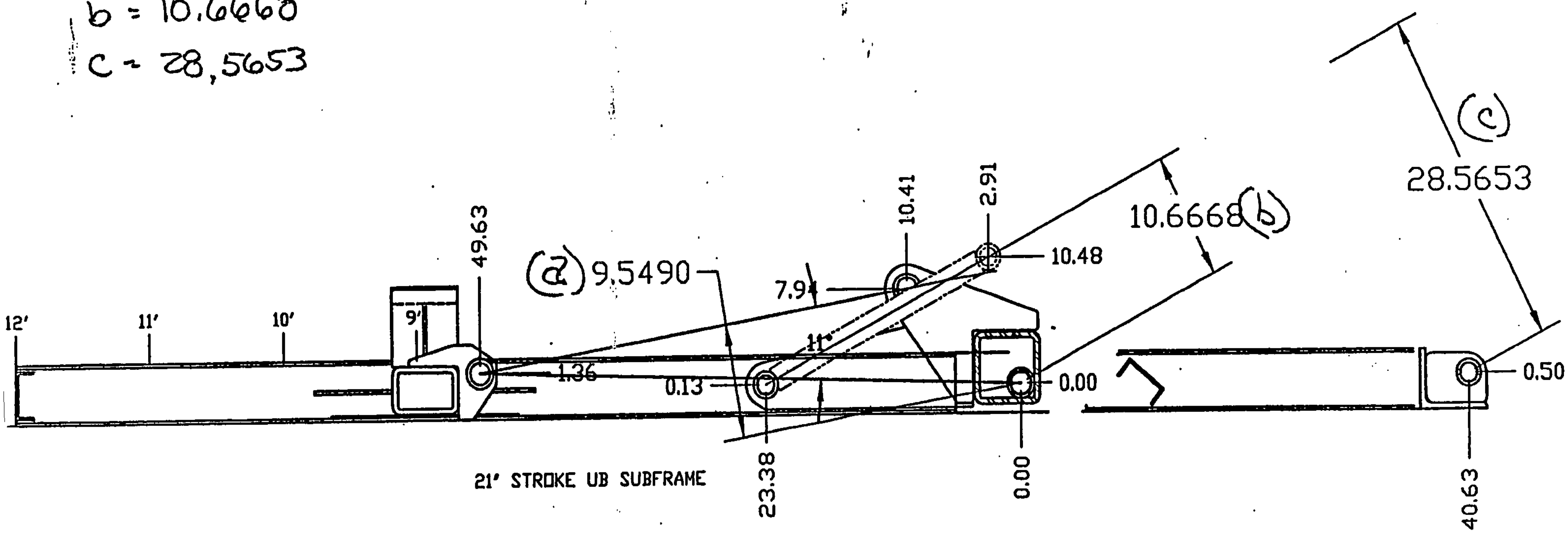


FIG. 4

GEOMETRY INVESTIGATION

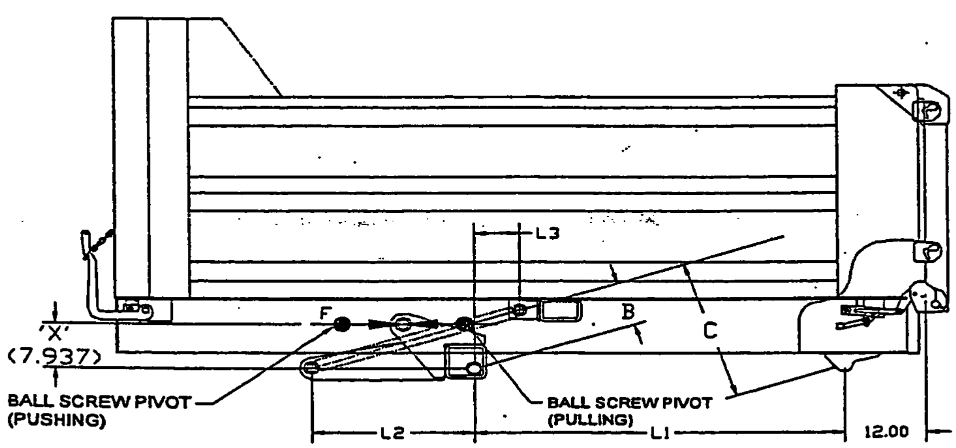
LARGEST RATIO OF C/B = LOWER BALL SCREW FORCE (F)

F = 1,950,000 / 7.937 / (C/B)

1,950,000 in-lb = NTEA torque rating for Class 60 rating

7.937 in = moment arm to ball screw from trunnion pivot

L1	L2	B	C	C/B	L3	F
42	24	10.336	27.672	2.68	-2.00	91,767
42	27	12.288	30.681	2.50	-6.50	98,399
42	30	14.325	33.687	2.35	-10.75	104,474
47	24	8.998	25.824	2.87	2.00	85,605
47	27	10.78	28.781	2.67	-2.91	92,022
47	30	12.659	31.756	2.51	-7.50	97,938
50	24	8.379	25.016	2.99	4.25	82,291
50	27	10.027	27.809	2.77	-0.75	88,585
50	30	11.697	30.435	2.60	-5.25	94,423
55	21	6.323	21.984	3.48	12.50	70,663
55	24	7.78	24.756	3.18	6.75	77,210
60	21	5.677	20.962	3.69	16.75	66,537
60	24	6.975	23.527	3.37	10.75	72,837



Most efficient = max C/B and max X

X limited by height

FIG. 5

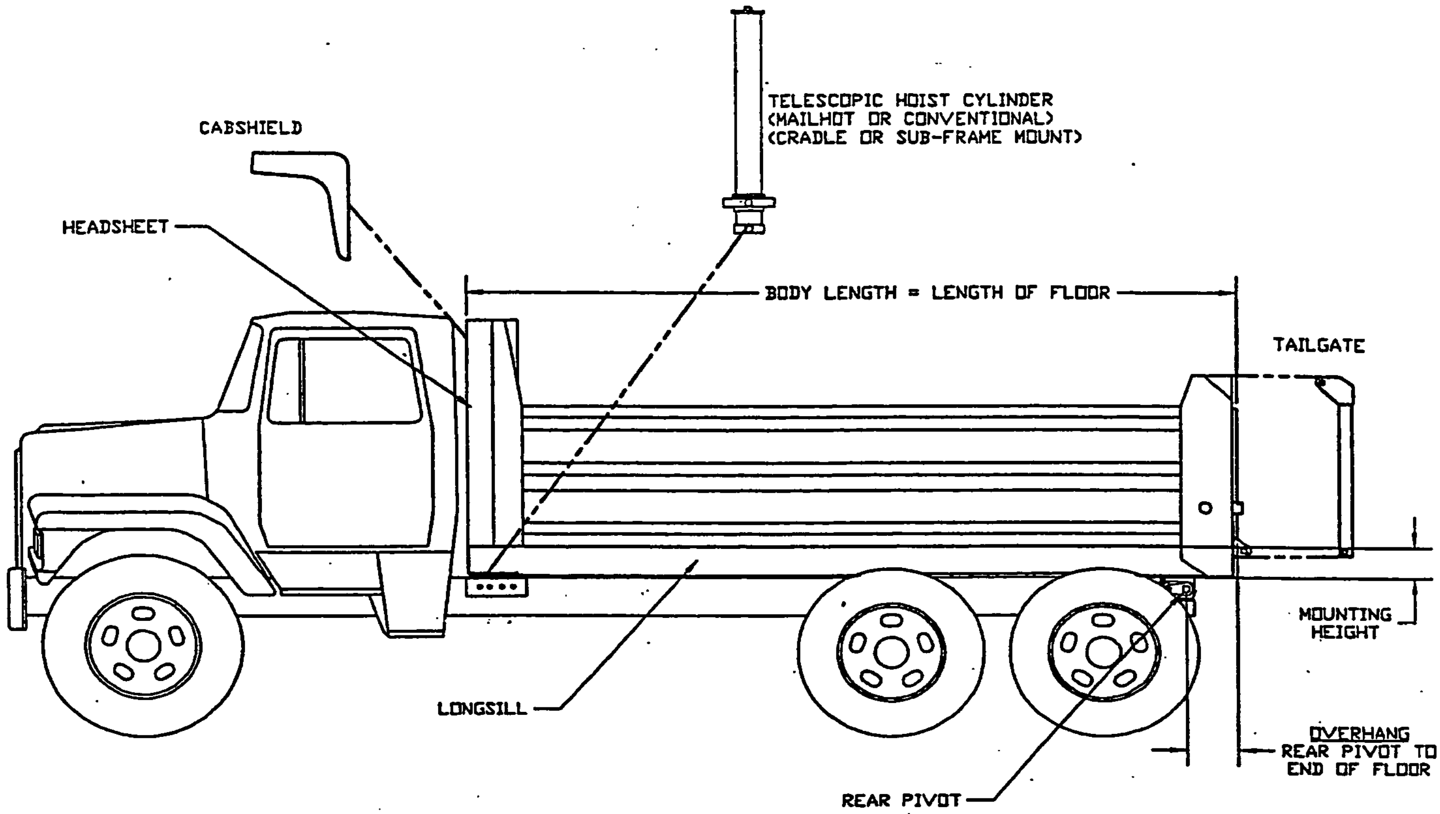


FIG. 6

TELESCOPIC HOIST CYLINDER

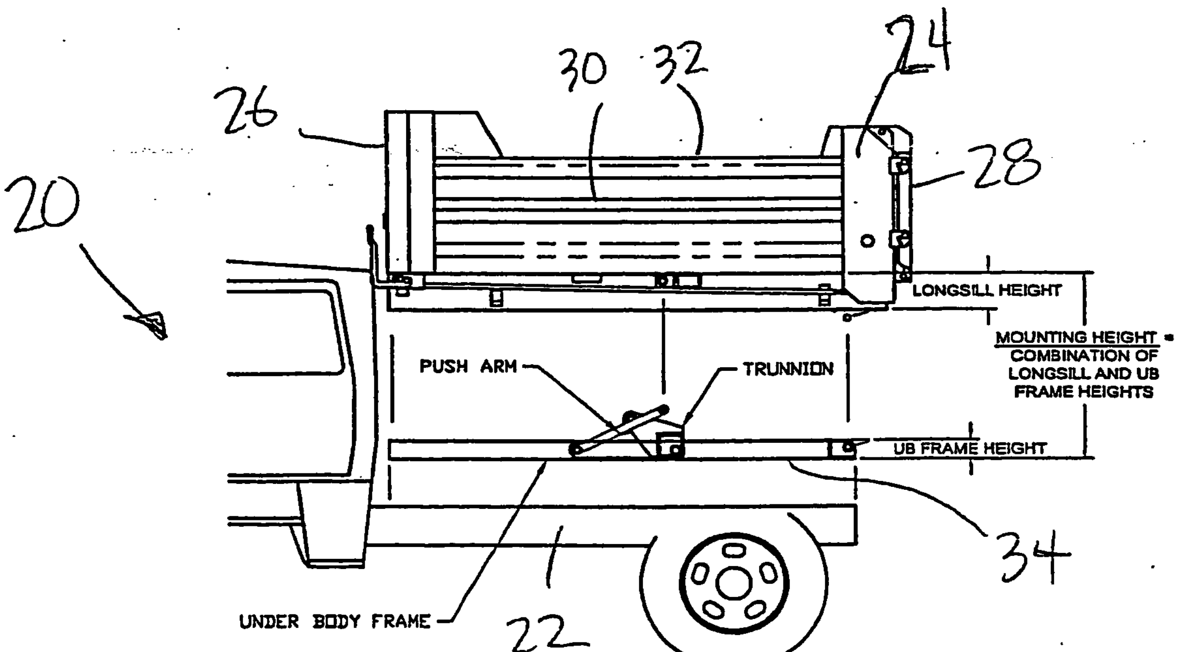


FIG. 7

UNDERBODY (UB) HOIST

CCGU TORQUE = 1,950,000 IN·

$$T = \frac{Fac}{b}$$

$$1,950,000 = \frac{F(7.937)\,28.0401}{10.7795}$$

$a = 7.9370$
$b = 10.7795$
$c = 28.0401$

$$F = \frac{1,950,000\,(10.7795)}{7.937\,(28.0401)}$$

$$= 94,449\ \text{lb.}$$

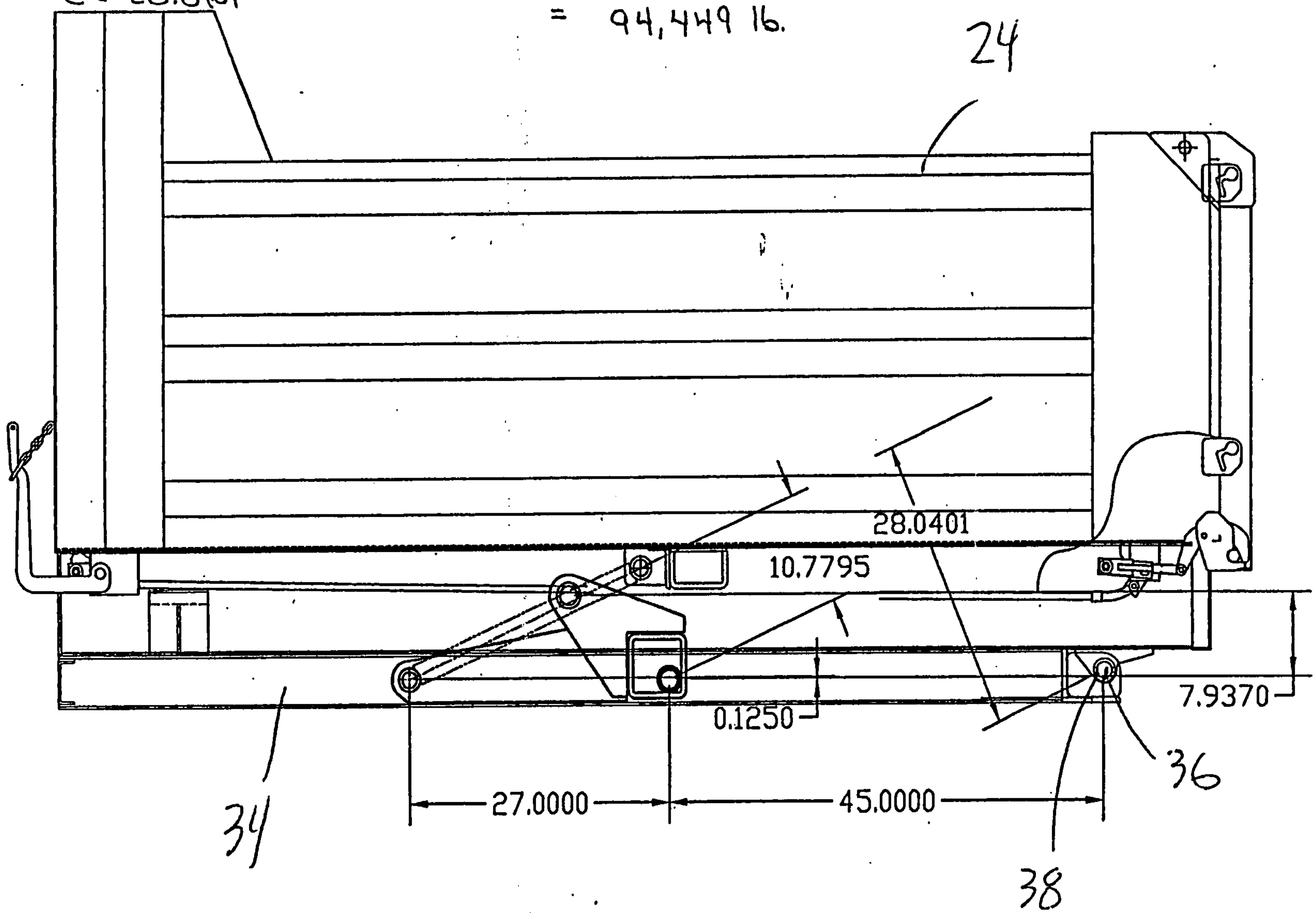


FIG. 8

FIG. 9

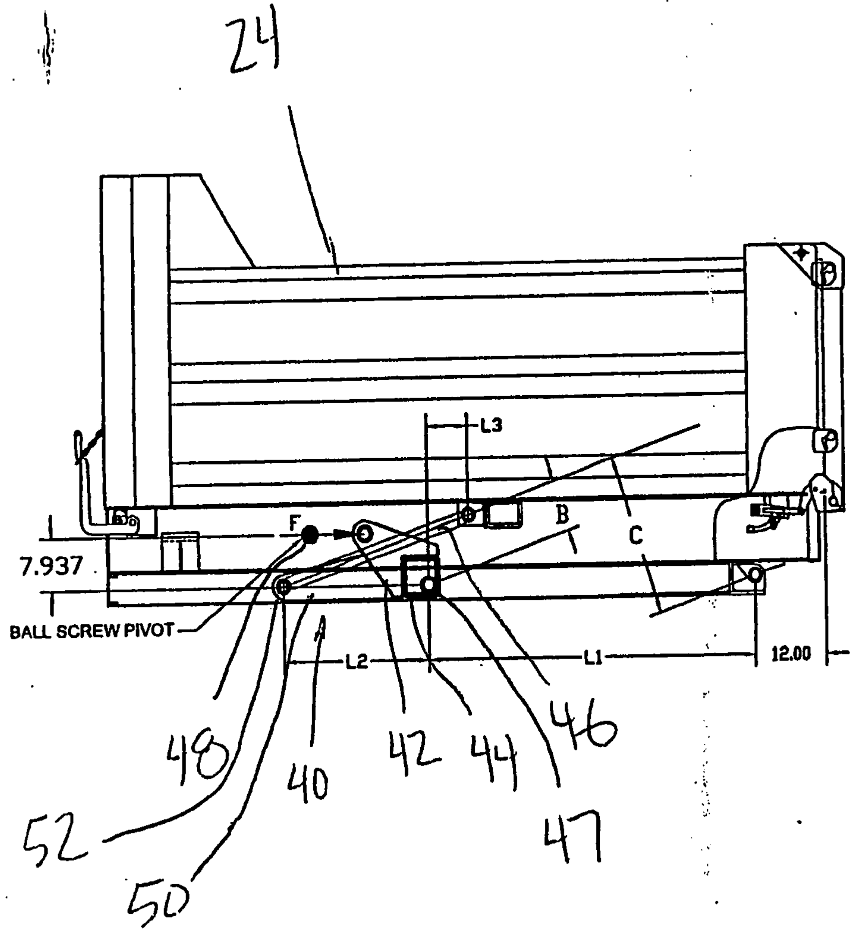
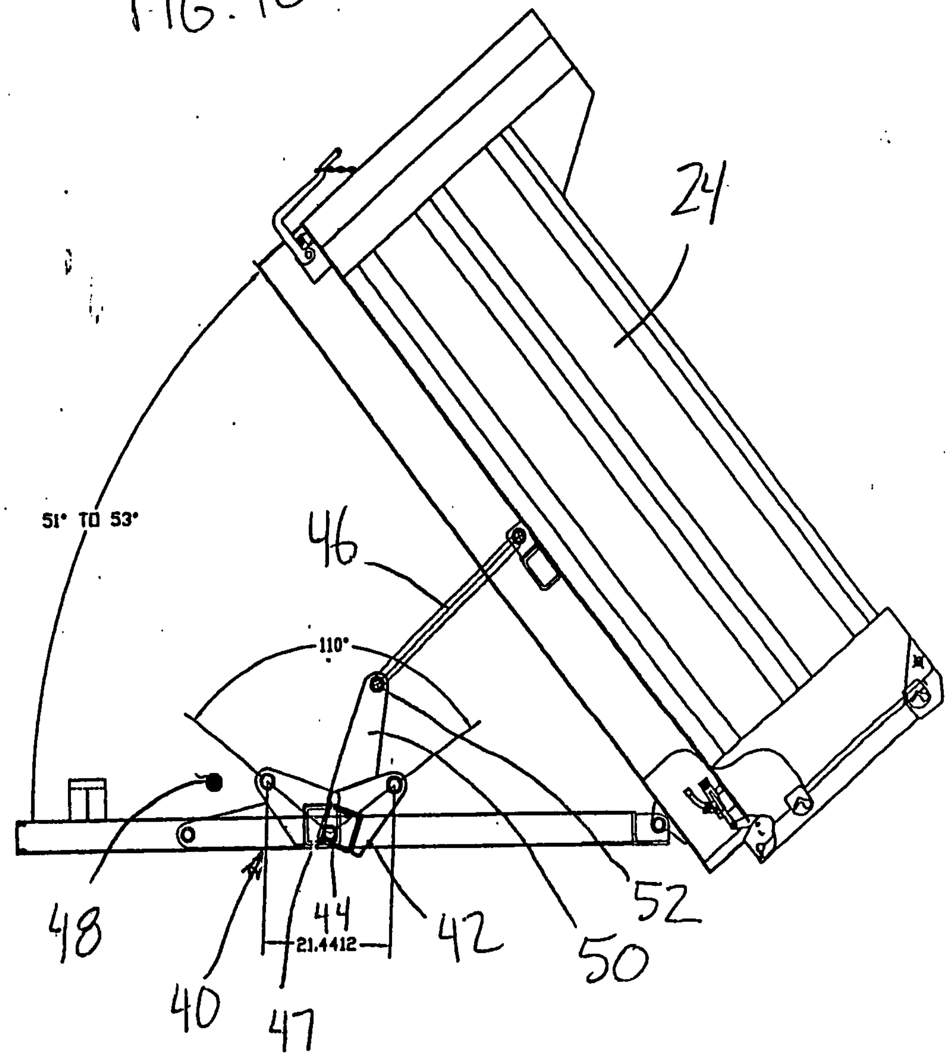
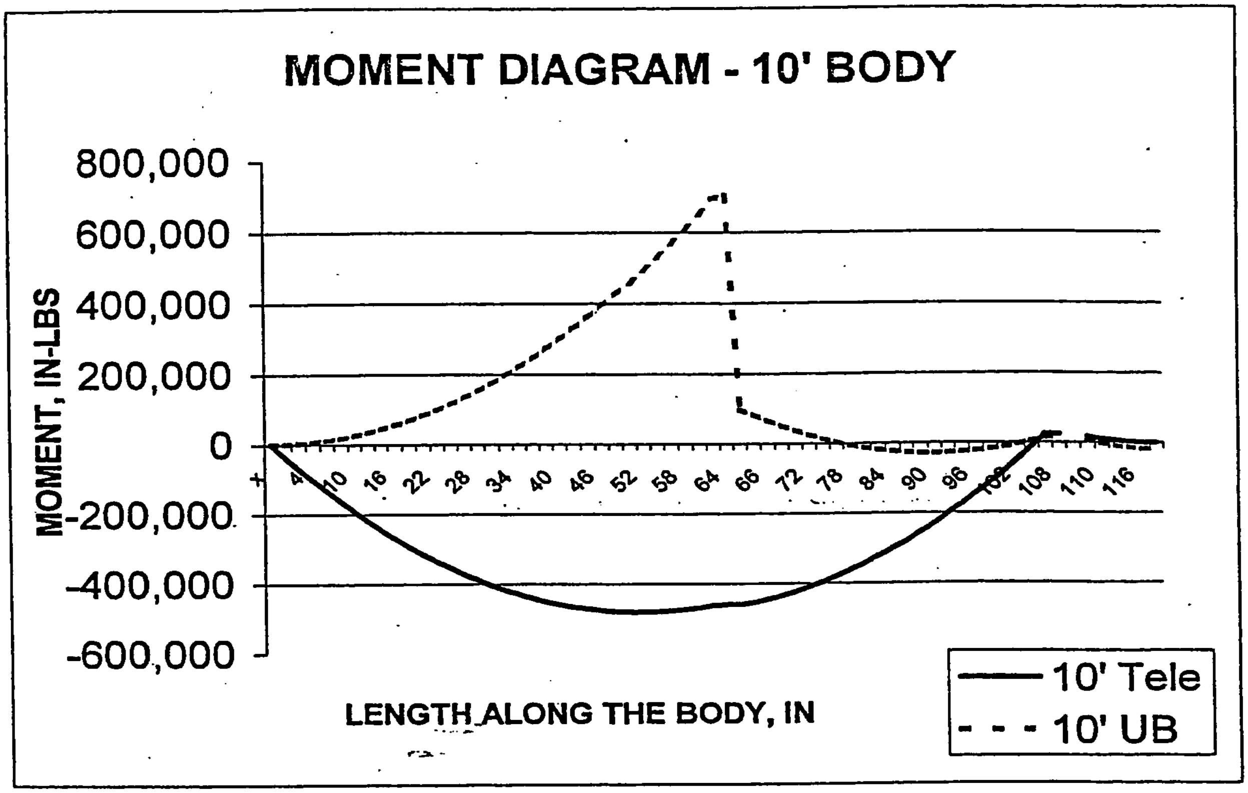

24
L3
F
B
C
7.937
BALL SCREW PIVOT
L2
L1
12.00
48
52
50
40
42
44
46
47

FIG. 10


24
51° TO 53°
46
110°
48
40
47
44
21.4412
42
50
52

DUMP BODY HOISTS



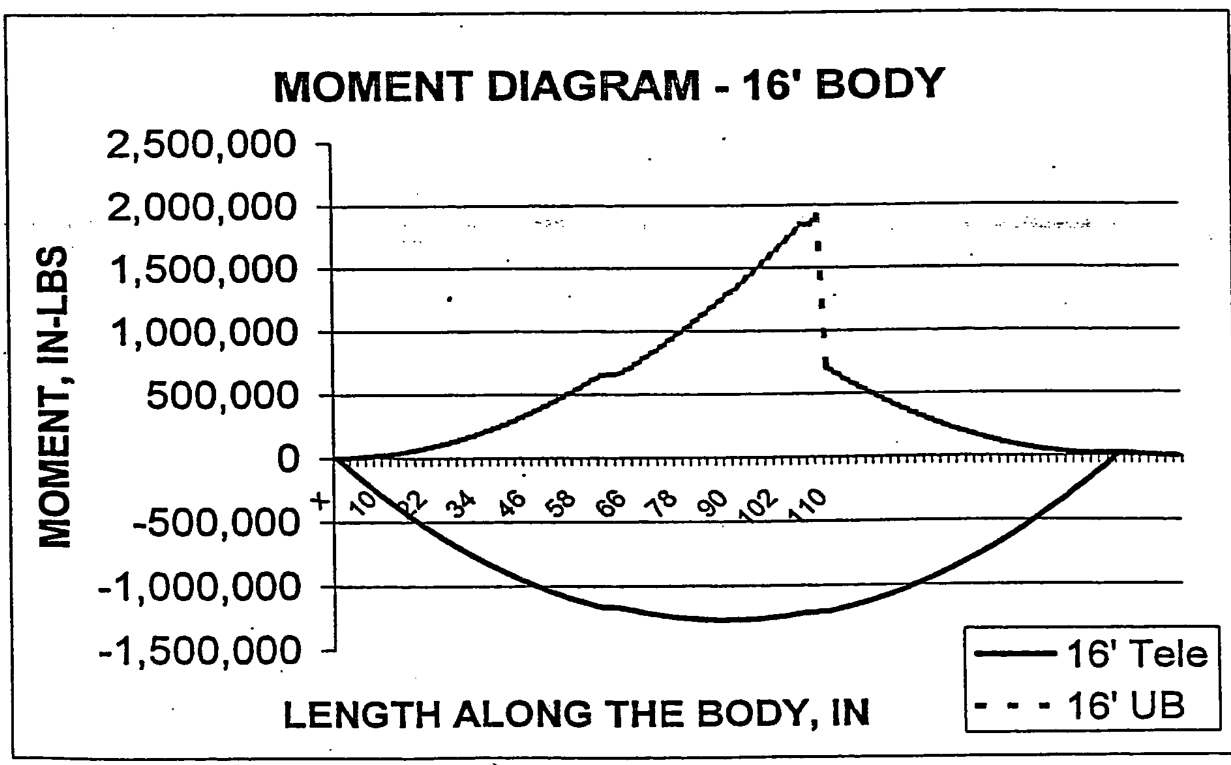
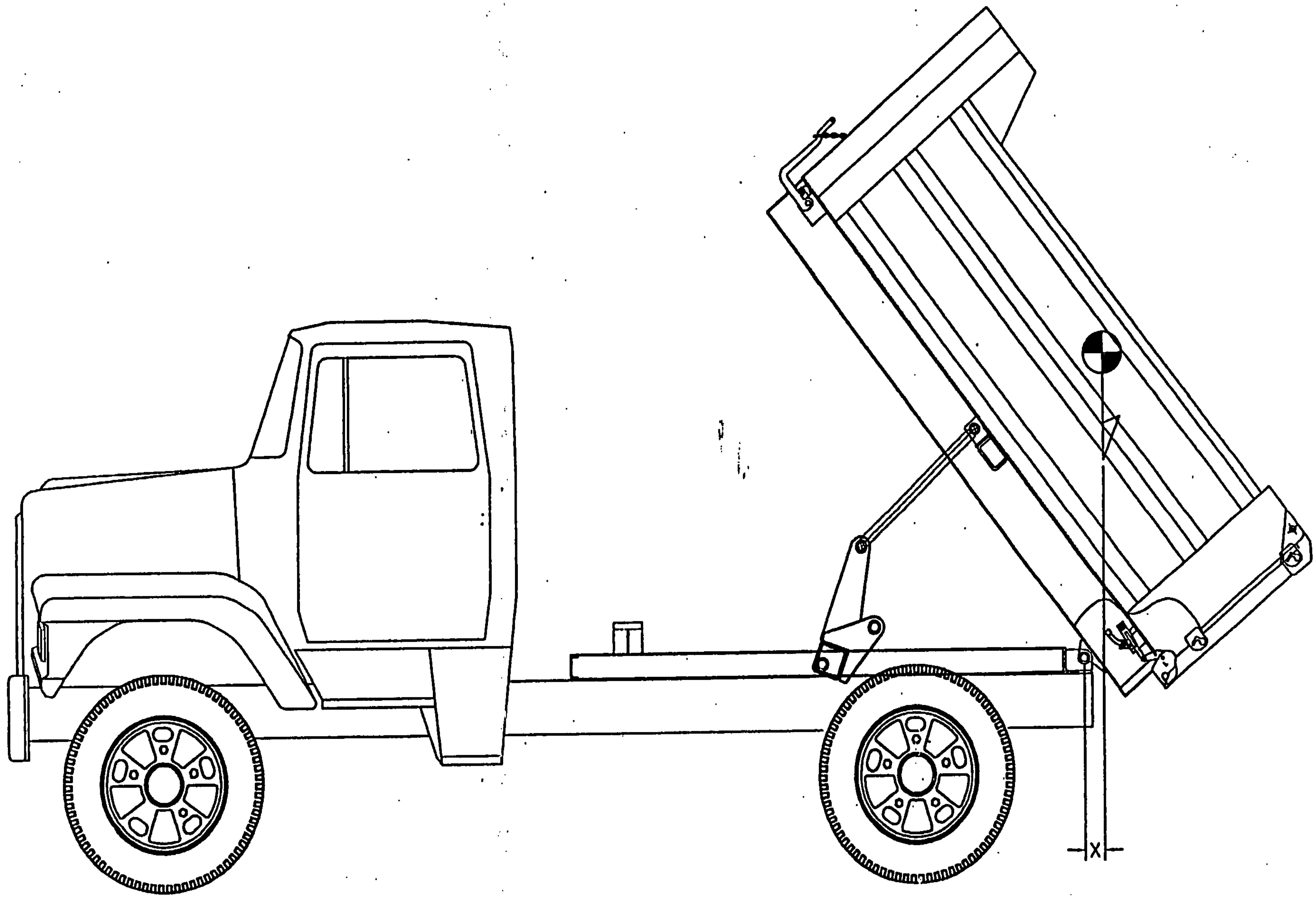


FIG. 11



DUE TO THE GEOMETRY OF CERTAIN HOIST AND BODY LENGTHS THE CENTER OF GRAVITY MAY BE BEHIND REAR PIVOT THUS REQUIRING THE BALL SCREW TO PULL THE BODY BACK DOWN

FIG. 12

FIG. 13

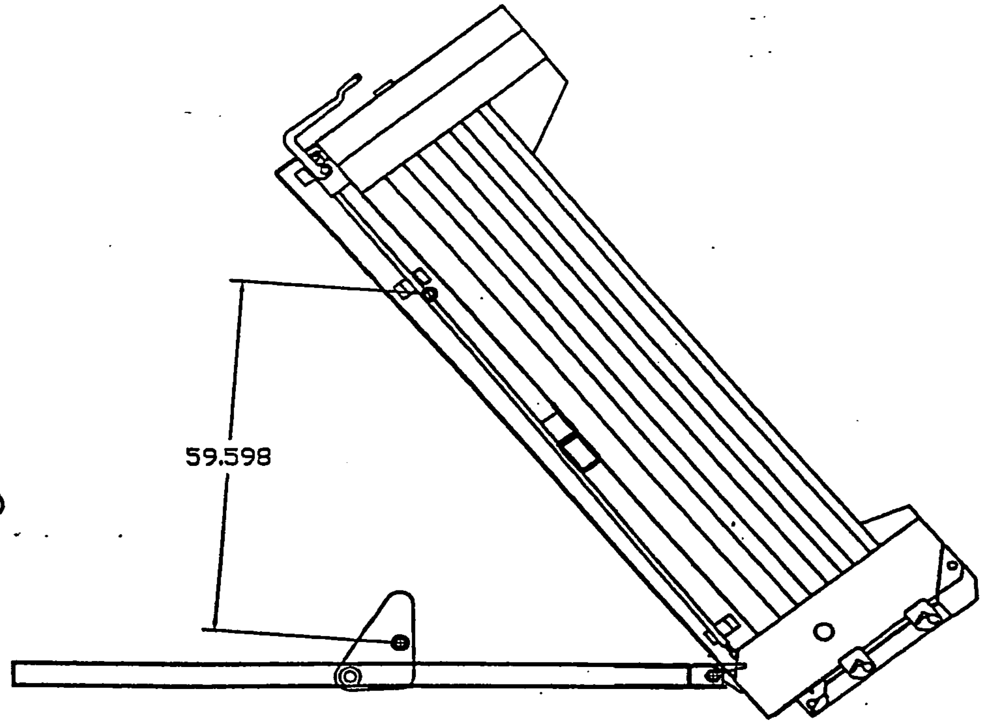
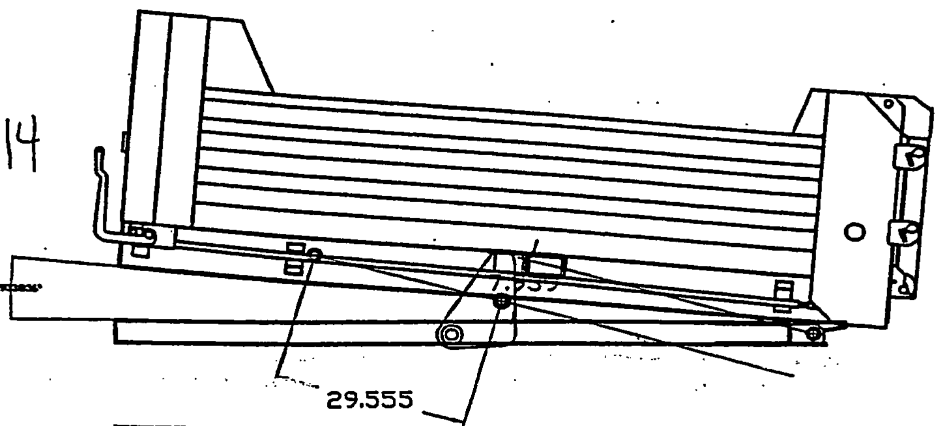


FIG. 14



$T = 41{,}639\ (7.939)$

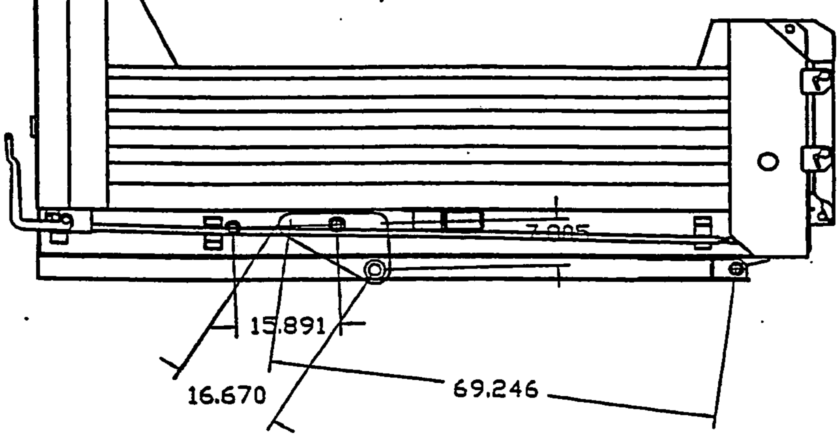
$= 330{,}572$ in.lb.

CG = 48 From Rear Pin

$$\frac{330{,}572}{48} = 688$$

LOAD

FIG. 15



CL50 = 1,350,000 in.lb.

$$T = \frac{F\ (7.805)\ 69.246}{16.670}$$

$$1{,}350{,}000 = \frac{F\ (7.805)(69.246)}{16.670}$$

F = 41,639 lb.

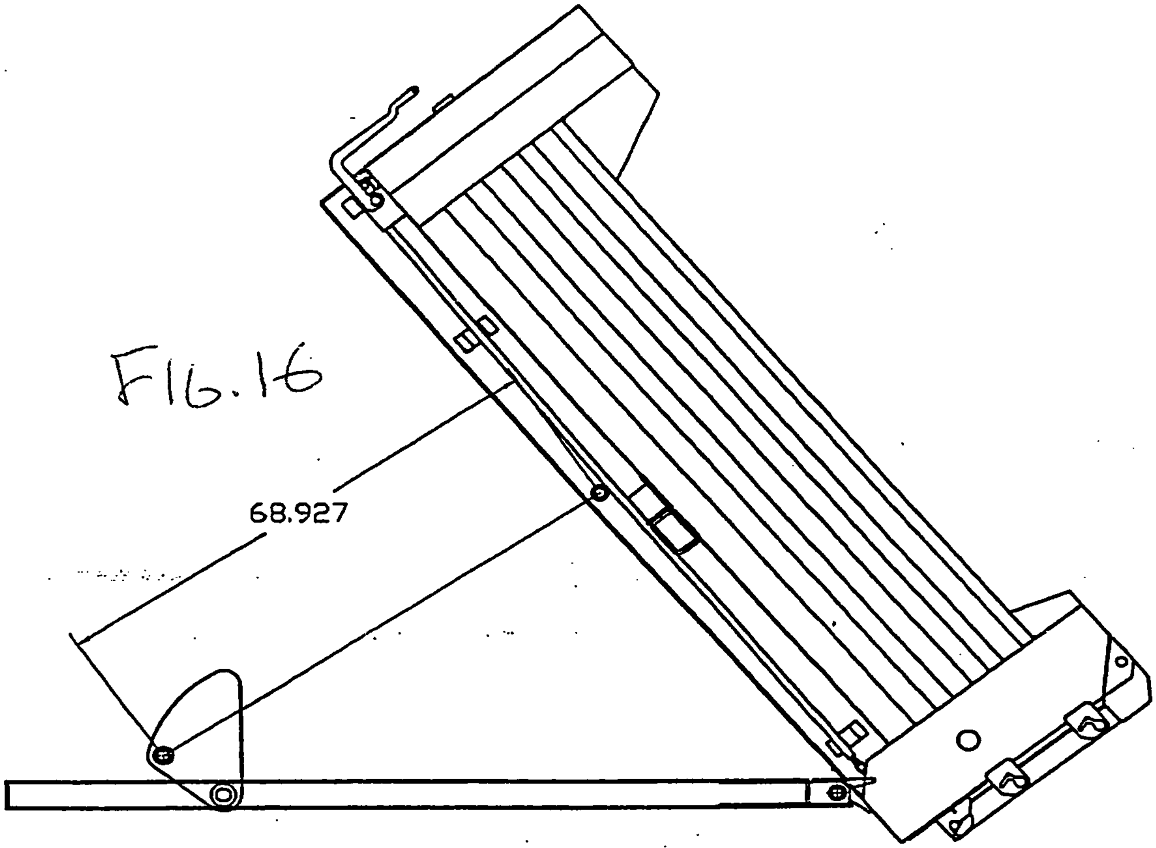


FIG. 16

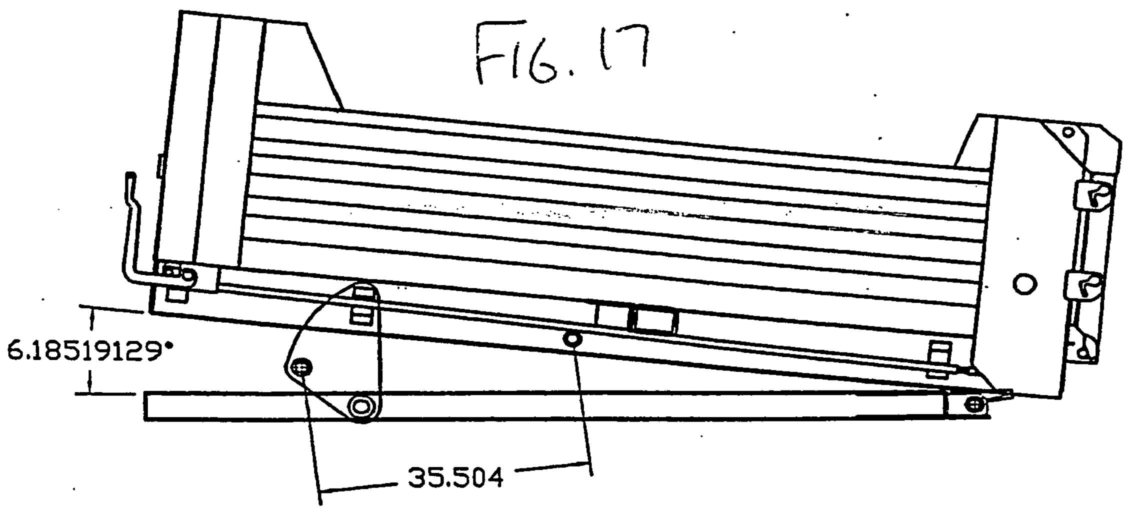


FIG. 17

FIG. 18